

## Class 500 Advanced KWh/Demand Meter

### INSTALLATION INSTRUCTIONS



### APPLICATION

The Class 500 Meter is a 3-element meter with communications. The device is used to monitor electric power usage of individual loads after the utility meter. **Installation must only be performed by qualified personnel and in accordance with these instructions and all applicable local and national electrical codes.**



## SPECIFICATIONS

**Input Voltage Configuration:**

3-wire (Delta) or 4-wire (WYE)

**Mains Voltage Input:**

Up to 600 VAC RMS available

**Input Power:**

6 VA maximum rating

**Current Sensor Rating:**

Up to 3200 Amp RMS AC available

**Power Factor:**

.5 leading or lagging

**Line Frequency:**

50-60 Hz

**Metering Accuracy:**

Certified to ANSI C12.16

**Voltage Operating Range:**

+/-10% of rated load

**Temperature Range (Class 500):**

NEMA 4 (Outdoor) Housing: -20 °C to +70 °C

NEMA 12 (Indoor) Housing: -20 °C to +50 °C

**Relative Humidity Range:**

0-95% non-condensing

**Altitude:**

2000 meters maximum

**Voltage Overload:**

+25% continuously; +100% for 20 cycles

**Current Sensor Overload:**

100% for 1 minute without damaging meter

**Pollution Degree:**

Degree 2 In accordance with IEC 664

**Installation (Overvoltage) Category:**

Category III

**Measurement Category:**

Category III

**Outdoor Housing Rating (Model numbers with an R at the end):**

NEMA 4

**Indoor Housing Rating (Model numbers without an R at the end):**

NEMA 12

**Display Readout:**

KWh accumulated

**Standard Ranges:**

(3 or 4 Wire) 120/208-240V: 100,200,400,800,1600, 3200 Amp

(3 or 4 Wire) 277/480V: 100,200,400,800,1600, 3200 Amp

(4 Wire) 346/600 V: 100,200,400,800,1600, 3200 Amp

**RS485 Serial Communication Interface:**

**Cable Specifications:** UL listed/rated telephone cord, 4 conductor, 300VAC, stranded conductors, 22-26 AWG.

**Input/Output Voltage:** Ground isolated +/-5.4 VDC

**Cable Connector:** RJ-11 connector

**Ckt Input Isolation:** 5.3 KVAC

**Max Cable Distance:** 4000 feet

**Max Network Nodes:** Maximum cabling nodes 52 including master node

**Baud Rate:** 9600

**Communications Options:**

RS232/RS485 (Standard) (Requires E-Mon Energy.)

Telephone Modem (Requires E-Mon Energy.)

Ethernet (Requires E-Mon Energy.)

Modbus RTU or TCP/IP (Requires third-party EMS/BMS.)

BACnet IP or MS/TP (Requires third-party EMS/BMS.)

LONworks TP (Twisted Pair) (Requires third-party EMS/BMS.)

**Recommended In-Line Fuse:**

**Manufacturer:** Littelfuse

**Mfg Part No.:** KLDR.100

**Rating:**100 mA, time delay. 600 VAC cartridge fuse

**Battery Cell:**

**Description:** Non-rechargeable cell used for memory retention.

**Manufacturer:** Eagle-picher

**Mfg Part No.:** LTC-3PN

**Working Voltage:** 3.5 Vdc

**Current Capacity:** 350 mAh

**Electrolyte:** Lithium thionyl nitrate

## INSTALLATION

**VERIFY** the input voltage rating and configuration on the unit panel label to ensure it is suitable for the intended electrical service. Meters labeled for 115/208 volt service **MUST NOT** be installed on service feeds of 277/480 volt and vice versa.

**VERIFY** that the Class 500 Meter current sensors are sized suitably for the load to be monitored. Compare the color of the arrows on the current sensors to the chart below to confirm the correct current sensor is being used.

Table 1. Sensor arrow color and rating

| Sensor Arrow Color Code | Sensor   |
|-------------------------|----------|
| Brown                   | 100 Amp  |
| Red                     | 200 Amp  |
| Yellow                  | 400 Amp  |
| Black                   | 800 Amp  |
| Blue                    | 1600 Amp |
| White/Black             | 3200 Amp |



### CAUTION

Internal circuit card components are extremely sensitive to electrostatic discharge. Prior to handling or touching the internal circuitry, discharge any static build-up on your person. To discharge yourself, touch a grounded metal object such as conduit or an earth grounded metal enclosure.



### WARNING

Use of the Class 500 Meter in a manner inconsistent with this manual or not specified by the manufacturer in writing can cause permanent damage to the unit and/or serious injury to the operator. The protection and safety features provided by this equipment may become impaired or otherwise compromised.



### WARNING

High voltages are present on main power terminal block, TB1. Risk of serious injury and/or electrical shock exists. Prior to performing any wiring operations, review all the contents of the user's manual and de-energize the MAINS power switch. Only qualified personnel should perform installation wiring. Installation wiring must comply with all local and national electrical codes.



### WARNING

Failure to ground the enclosure creates a possible shock hazard. Do not operate the Class 500 Meter without a protective earth wire attached securely to the PE terminal screw. After installing the protective earth wiring, secure the screw tightly (10 N-m torque). NEVER open the front panel of the unit while the unit has MAINS power applied. Failure to comply can increase the risk of serious injury and for electrical shock.

## Internal Electronic Assemblies

The unit is composed of two major subassembly boards: the main power and display boards (See Fig. 1).

NOTE: Units supplied in a NEMA 12 metal enclosure are suitable for indoor applications only. For outdoor installation, use the NEMA 4 enclosure.

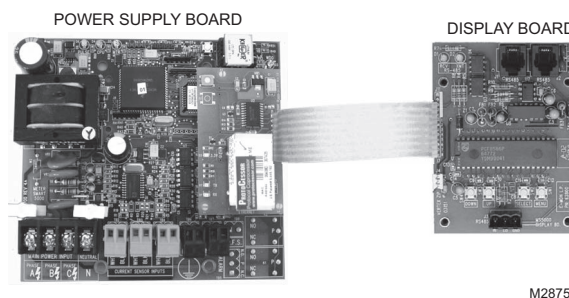


Fig. 1. Subassembly boards in the Class 500 Meter.

## Main Power Board

Connections to this board include the MAINS input voltage, current sensors, and external pulse input (See Fig. 2).

The MAINS input terminals are covered with a protective clear shield for safety purposes. The current sensor assemblies interface to TB2, TB3 or TB4. Each header connector input corresponds to an input voltage phase; therefore, care must be exercised to ensure each current sensor is connected to the correct input header.

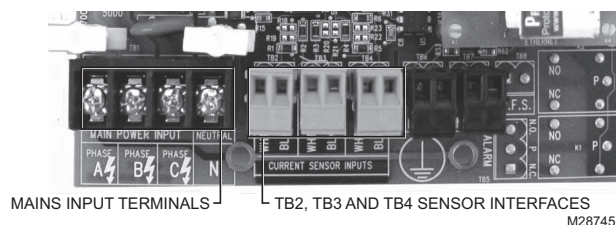


Fig. 2. MAINS power board of the Class 500 Meter.

## Display Board

The display board interconnects to the main power board via a flex ribbon cable, and the board mounts on the inside of the housing door. The only required connection is for RS485 communications. When the meter is operated as a stand-alone unit using the modem for communications, the RS485 connections are not required. The display board LCD readout indicates the cumulative kWh value as well as errors associated with the Class 500 Meter, such as low battery or sensor errors.

# METER INSTALLATION

## Mounting

1. Using appropriate sized mounting hardware, fasten the Class 500 Meter enclosure to the selected mounting surface. The four housing mounting holes are centered 6.75" H x 4" W.

NOTE: Units installed outdoors must use the NEMA 4—rated enclosure.

## Main Power Board Connections

1. **Installing a temporary ground for ESD protection:** With all the circuits de-energized, connect a temporary protective earth ground connection for ESD protection. **Prior to performing any unit wiring, be sure to discharge any static on your person.**
2. **Installing the Class 500 Meter protective earth ground:** Connect an earth ground wire to the Class 500 Meter protective earth ground terminal screw located on the bottom right side of the main power board. After installing the protective earth ground wire, securely fasten the protective earth ground screw.

## WARNING

**Failure to attach the protective earth ground wire securely to the enclosure creates a potential shock hazard. Do not operate the meter without a protective earth ground connection securely installed.**

3. **Wire entry:** Two openings exist on the standard enclosure; one for 1/2" conduit and one for 3/4" conduit. The 3/4" conduit opening located on the bottom edge of the housing is used to bring in MAINS power and current sensor wiring. The 1/2" conduit opening located on the top edge of the housing is used to interface the low voltage signals and RS485 communications wiring to the unit. Route the appropriate cabling to and through the respective enclosure opening.
4. **Unit MAINS wiring:**
  - a. Remove the clear shield located over terminal block TB1 on the main power board. This shield can be removed by pressing in on each locking tab located at the top of each standoff. While pressing the tabs inward, lift the shield from the standoffs. Wire each connection to terminal block TB1 with stranded wire 14-12 AWG, rated at 600 VAC.
  - b. Strip back all wire insulation to expose between 1/4" and 3/8" of the copper conductors. Gently twist each wire's conductors to prevent fraying. Insert the conductors into their respective terminal block position and tighten down the terminal block screw to securely fasten the conductor. Terminal block TB1 is clearly labeled PHASE A, PHASE B, PHASE C, and NEUTRAL.
  - c. Connect the NEUTRAL wire to the appropriate terminal block position.

NOTE: For delta MAINS input wiring, DO NOT connect the NEUTRAL wire. Remove the terminal block screw for this position.

- d. Connect the three AC mains power wires (PHASE A, PHASE B, and PHASE C) to their respective positions as labeled on terminal block TB1. After all conductors are connected to their respective terminal block positions and tightened down, verify each terminal block screw is securely fastened by gently tugging on each conductor. Verify that no conductor wires are frayed or shorting to adjacent terminal block positions.

**5. External switch mechanism/in-line fuse installation:**

- a. To ensure a safe installation, the Class 500 Meter requires an external switch mechanism, such as a circuit breaker, be installed to the Class 500 Meter MAINS input wiring. The switch mechanism must be installed in close proximity to the Class 500 Meter and be easily reachable for the operator.  
This device must also be marked as the disconnecting device for the Class 500 Meter.
  - b. Install 1/10 Amp Slow Activation inline fuses with the suitable voltage rating for each conductor phase at the MAINS input to the meter. The fuses must be labeled to indicate voltage and current rating as well as element characteristics. The fuse element must be a slow-activating type.
- 6.** Once the MAINS wiring is complete, close the enclosure front panel and secure the panel to the enclosure using the locking mechanism. Activate the external circuit breaker or equivalent switch to apply AC MAINS power to the unit. The Class 500 Meter display should turn on and indicate total kWh accumulation reading.

**NOTE:** The unit display, clock, schedule, and other critical configuration parameters will be reset once the unit is completely wired and ready for commissioning. Resetting and configuring these parameters must be done through a host computer, locally or remotely, via an RS485 or ethernet link.

7. Using an AC voltmeter, verify that the input voltage readings are within the limits specified in Table 2.

**NOTE:** On 3-wire systems the voltages are measured Phase to Phase.  
On 4-wire systems the voltages are measured Phase to Neutral.

**Table 2. Input voltage limits**

| Meter Input Voltage/Configuration | Normal Voltage | Limits (+/-10%) |
|-----------------------------------|----------------|-----------------|
| 120/208V, 3Ø, 4 Wire              | 120 VAC        | 108 to 132 VAC  |
| 277/480V, 3Ø, 4 Wire              | 277 VAC        | 249 to 305 VAC  |
| 346/600V, 3Ø, 4 Wire              | 346 VAC        | 311 to 381 VAC  |
| 240V, 3Ø, 3 Wire                  | 240 VAC        | 216 to 264 VAC  |
| 480V, 3Ø, 3 Wire                  | 480 VAC        | 432 to 528 VAC  |

8. Remove power from the unit by de-energizing the external switch.

## Current Sensor Installation and Wiring

Once the AC voltages have been confirmed to be within acceptable limits, you are ready to install the current sensors. The main power board contains three header connectors located at the bottom center of the board, TB2, TB3, and TB4.

TB2: Phase A current sensor input  
TB3: Phase B current sensor input  
TB4: Phase C current sensor input

The Class 500 meters are shipped with split-core current sensors.

1. Split-core current sensor: This sensor opens so that it can be attached around the circuit conductor being monitored without interrupting power.
2. Split-core current sensors output a 0-2 VAC signal, proportional to the current being measured.

## Installing the Split Core Current Sensor Assembly

1. Each phase being monitored will require one two-piece current sensor assembly. Therefore, a three-phase meter will require three (3) assemblies. Open the two-piece current sensor assembly by releasing the nylon clamp using a flat head screwdriver.
2. Reassemble the current sensor assembly around the conductor(s) to be monitored. Ensure the current sensor halves marked "Load" are both facing the load side of the conductor. The colored arrow will be on the source side of the conductor being monitored and **MUST** be pointed in a clockwise direction around the conductor being monitored. Tighten the nylon clamp to complete the assembly.



Fig. 3. Split core current sensor assembly.

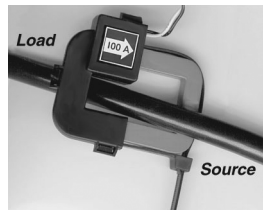


Fig. 4. Split core current sensor assembly installed.

**IMPORTANT:**

When looking from the source side of the conductor(s) being monitored, you should see the arrow on the current sensor assembly. The arrow should be pointing in a clockwise direction around the conductor(s) being monitored. If the arrow is not positioned on the source side, the resulting readings will be inaccurate.

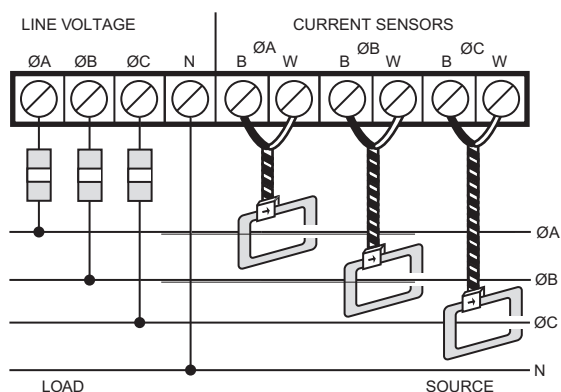
## Current Sensor Wiring

Once all the current sensors are installed onto their appropriate phase conductors, you can begin terminating the current sensors onto the Class 500 Meter main board.

The current sensor leads can be extended up to 500 feet for remote monitoring applications. To extend the length of the wires, use #22 AWG twisted pair wire with a black and white conductor, rated for 600 VAC.

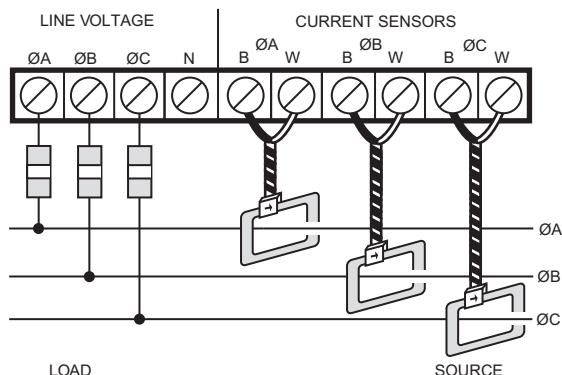
The current sensor connection points are located on the bottom center of the main power board. Three removable plugs exist, one for each current sensor phase input. The header portions of the connectors are labeled TB2, TB3, and TB4. The silkscreen located in front of each connector instructs you which terminal of the plug is for the white conductor and which terminal is wired to the black conductor. Once each current sensor is wired to its respective plug, insert each plug into the appropriate header.

## MAINS LINE VOLTAGE AND CURRENT SENSOR WIRING DIAGRAMS



NOTES: LINE VOLTAGE CONNECTIONS: 14-22 AWG  
 SENSOR CONNECTIONS: B=BLACK LEAD, W=WHITE LEAD  
 1/10A, 600 VAC INLINE FUSE PER CONDUCTOR.  
 LITTLEFUSE PART NUMBER KLDR 100.  
 NEUTRAL NOT USED IN DELTA SYSTEM. REMOVE NEUTRAL  
 TERMINAL BLOCK SCREW FOR DELTA SYSTEMS. M32788

Fig. 5. 3-phase, 4-wire installation diagram.



NOTES: LINE VOLTAGE CONNECTIONS: 14-22 AWG  
 SENSOR CONNECTIONS: B=BLACK LEAD, W=WHITE LEAD  
 1/10A, 600 VAC INLINE FUSE PER CONDUCTOR.  
 LITTLEFUSE PART NUMBER KLDR 100.  
 NEUTRAL NOT USED IN DELTA SYSTEM. REMOVE NEUTRAL  
 TERMINAL BLOCK SCREW FOR DELTA SYSTEMS. M32797

Fig. 6. 3-phase, 3-wire installation diagram.

## Line Voltage/Current Sensor Diagnostics

Ensure that the three-phase AC MAINS voltage wiring and the current are connected in the proper phase sequence. If there is a phase sequence error, the display LCD will show the message "Check Sensor" in the upper right hand corner. Additionally, LED D5 labeled "MTR" (See Fig. 7) will flash at a rate of twice per second in the event of a phase error or missing phase voltage(s).

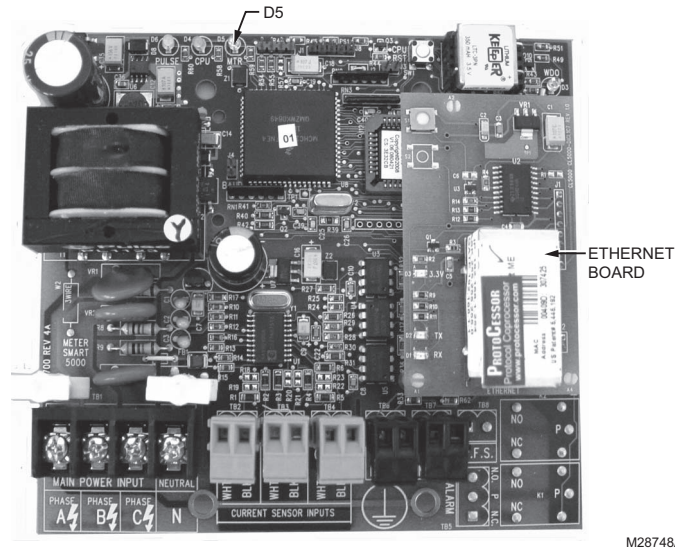


**Fig. 7. Location of LED D5 (labeled “MTR”) and Ethernet board.**

Verify that the AC MAINS voltage wires are all connected to the correct positions on terminal block TB1. Inspect the MAINS input wiring to verify each conductor is terminated at the correct terminal block position. Using an AC voltmeter, measure the AC voltage for each Phase to Neutral terminal and to the frame ground point.

Load each current sensor by running at least 1% of the full-scale rated current through the conductor being monitored by each phase. For example, a 2 Amp load is required on 200 Amp rated sensors for each phase to perform sensor diagnostic procedures.

- Verify that the current sensor white and black conductors are installed in the correct header positions.
- Verify that the current sensors are installed in the correct direction on the conductor being monitored.
- Verify that the current sensors plugs are terminated in the correct header on the Main Power board.

If the error messages still haven't been cleared, measure the AC voltage output across the plug terminals of each current sensor individually. Set the AC voltmeter to the 20 volt scale. If a reading of zero volts is indicated on the voltmeter, check for an open circuit. An open could exist at the plug terminals or at a splicing junction. Also verify that the core halves are assembled tightly.

### Final Main Power Board Checks

Once the phase error has been corrected, the display LCD “Check Sensor” error should extinguish and the main power board LED D5 should flash at a rate of once per second. Also verify that LED D4, labeled “CPU”, is flashing at a rate of once per second and synchronously with LED D5.

Wiring to the Network

RS-485 Wiring for BACnet MS/TP, Modbus RTU, or EZ-7

The Class 500 Meter contains an RS-485 serial communications port allowing it to communicate via BACnet MS/TP, Modbus RTU, or EZ-7. The units can be daisy-chained together over distances of up to 4000 feet. Up to 52 unit nodes can be networked together. The meters are networked in a daisy-chain configuration with BELDEN 1120A cable or an equivalent. A cable rating of 600V allows a RS-485 network to be connected to 480-volt meters. Communications wiring should enter/exit the Class 500 Meter enclosure through the 1/2 in. hole located on the upper (top) surface of the enclosure using a 4-conductor, UL-approved telephone cord terminated with an RJ-11 male connector.

NOTE: A 3-screw terminal block is also available for the RS-485 wiring, as an optional method.

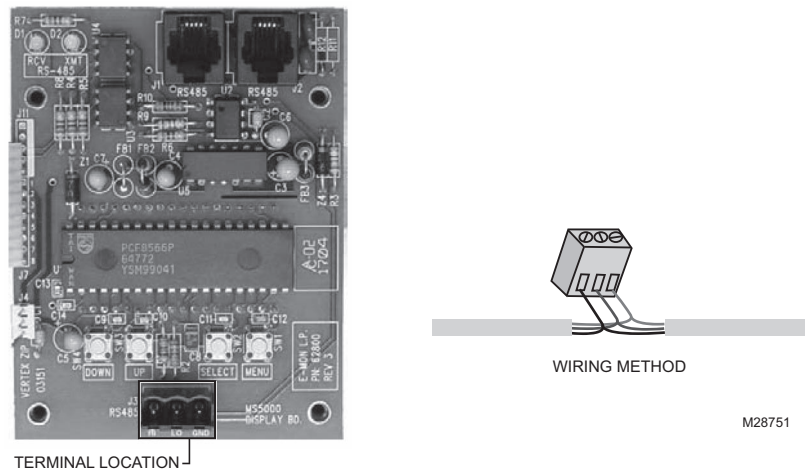


Fig. 8. Modbus terminal location and wiring method.

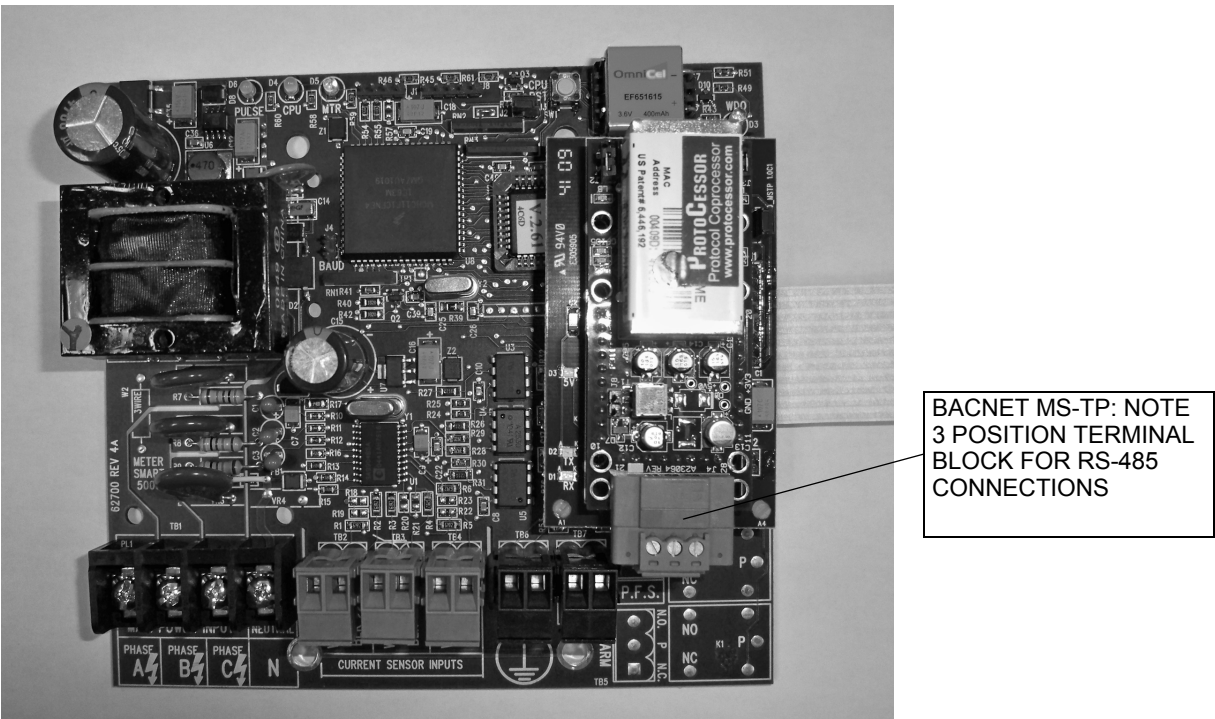


Fig. 9. BACnet wiring with RS-485 connection.

The meter is shipped with a Modbus ID number of 01. This must be changed if the network has more than one meter installed. The change must be done before the meter is introduced into the network, or it can be put on the network as the only device on the network and Modbus address changed before adding additional devices.

The meter can be numbered from 1 to 247. There can be no duplicate numbers on a network, so caution must be taken when assigning a meter ID number prior to its installation on the RS-485 network.

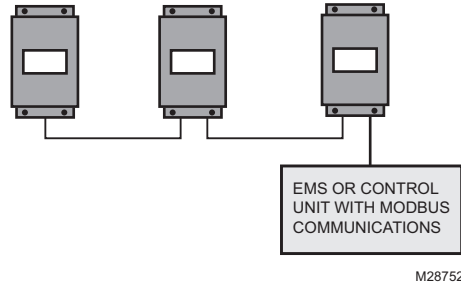


**Fig. 10. Modbus installation overview.**

#### **METHOD 1: DAISY-CHAIN WITH WIRE TERMINAL (MOST COMMON METHOD)**

1. Connect the "HI" terminal (Display PCB J3 Pin 1) of each Class 500 unit together so that all unit HI terminals are linked (HI to HI to HI, etc.).
2. Connect the "LO" terminal (Display PCB J3 Pin 2) of each Class 500 unit together so that all unit LO terminals are linked (LO to LO to LO, etc.).
3. Connect the "GND" terminal (Display PCB J3 Pin 3) of each Class 500 unit together so that all unit GND terminals are linked (GND to GND to GND, etc.).
4. After completing the wiring of connector J3 for all units, complete the wiring to the EMS through the appropriate input terminals (RS485 or Ethernet).

#### **METHOD 2: DAISY-CHAIN WITH MODULAR JACKS**

1. Each display board has two RJ-11 jacks available to facilitate RS-485 daisy-chain connections. Using RJ-11 four-conductor cable, wire each cable end pin to pin. Interconnect all units together with the RJ-11 cabling.
2. After daisy-chaining the units is complete, the system can be interfaced through the wire terminal on the meter closest to the EMS (see method 2).

### **LON and BACnet MS/TP Wiring**

For LON and BACnet MS/TP connections, follow standard wiring procedures/topologies for these communication types. Both of these connections are found on the communications board which sits on the main power board (not on the display board). The LON is a two position terminal block for twisted pair, and the BACnet MS/TP is a 3 position terminal block.

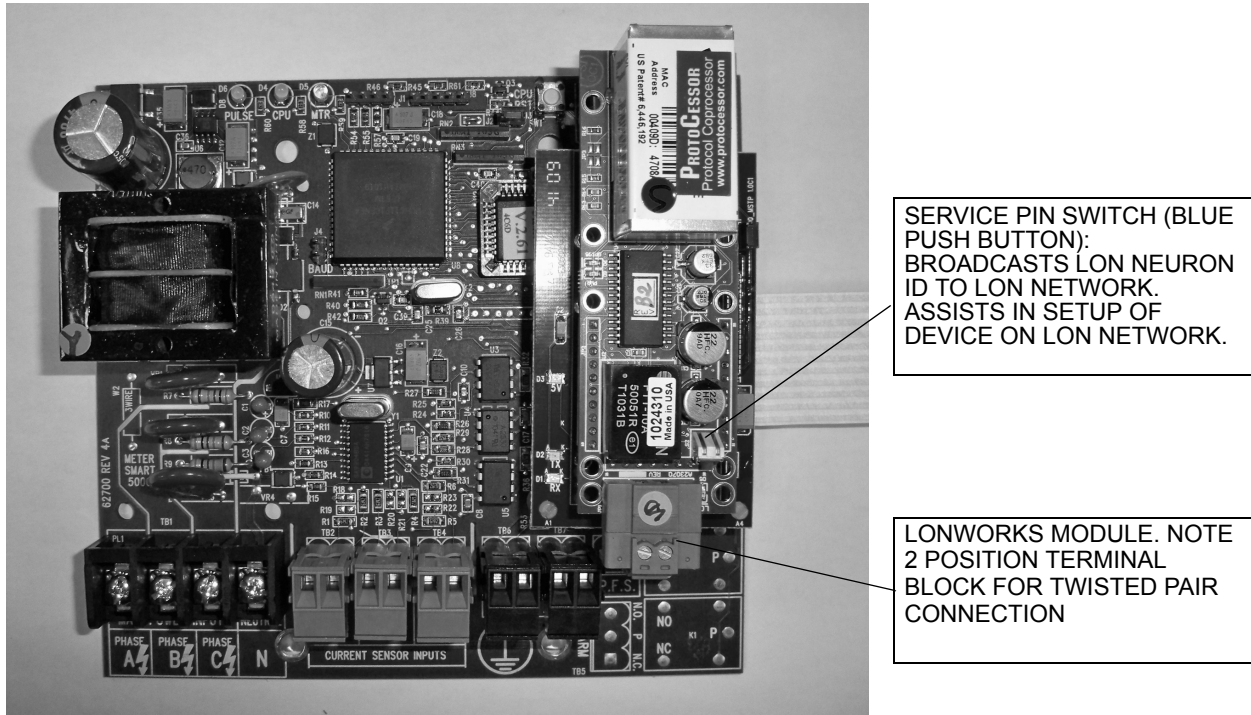


Fig. 11. LON wiring.

## Ethernet wiring for BACnet IP, and Modbus TCP/IP and Ethernet EZ-7

These models are shipped with a board that allows for Ethernet communication via Modbus TCP/IP, BACnet IP or Ethernet EZ-7. EZ-7 protocol is required when using the Energy Software.

Modbus TCP/IP and BACnet IP, and Ethernet EZ-7 connections are made to the RJ45 connection on the Ethernet board (Fig. 7 on page 7). No RS-485 daisy-chain capabilities exist with these Ethernet connections.

## MONITORING MULTIPLE LOADS WITH ONE CLASS 500 METER

The Class 500 Meter provides extreme flexibility by allowing additional sets of current sensors to be used in parallel so multiple load locations can be monitored by one Class 500 Meter. This feature allows a totalized display readout of two or more load circuits.

You may use parallel sensors to monitor specific breakers from one panel, specific breakers from more than one panel, two or more complete panels, etc.

When paralleling current sensors, the following rules must be followed for accurate readings:

1. Current sensors must be installed in complete sets of three, with a maximum of three sensors installed in parallel per phase.
2. All sensors used in parallel must be of the same amperage rating (i.e. 100 Amp, 200 Amp, etc.). The rating is determined by the current rating (amperage) of the Class 500 Meter. For example, a 200 Amp Class 500 Meter must use extra sets of 200 Amp current sensors.
3. All locations being monitored must have the same power source. A 480 volt Class 500 Meter, for example, cannot monitor a 208 volt load circuit nor can a Class 500 Meter monitor two 480 or 208 volt loads if they are from different originating power sources or from different transformers.
4. The display readings must be multiplied by the number of sets of current sensors installed. For example, for Class 500 Meter reading of 5 KWH with 2 sets of currents sensors you will have  $5 \times 2 = 10$  KWH (actual usage).

NOTE: One set of current sensors equates to three sensors, one per phase. The multiplier only applies when extra sets of current sensors are installed on one Class 500 Meter. Therefore, if you are using only one set of three current sensors, the multiplier is not required.

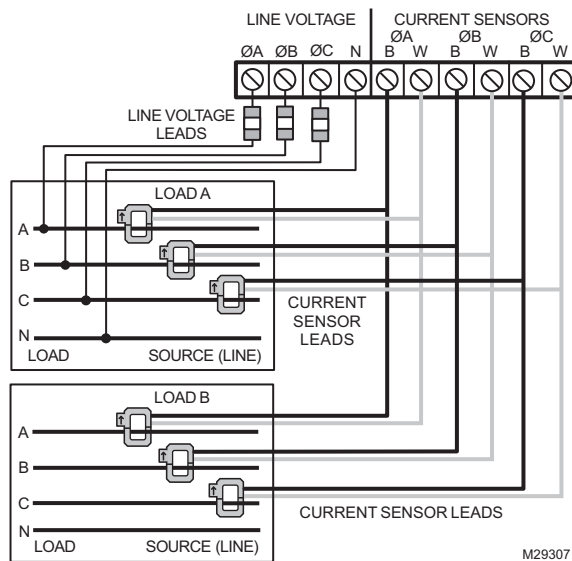


Fig. 12. Parallel current sensor installation diagrams.

## CONFIGURING THE CLASS 500 USING E-MON ENERGY™ SOFTWARE

E-Mon Energy is a product of Honeywell, Inc. This software operates on a computer running Windows 2000, XP, Vista or Windows 7 and is used to interface to many products including the Class 500. E-Mon Energy Software requires data access via the EZ-7 protocol.

Reference the E-Mon Energy software for specific instructions to perform the following operations:

- Peak Demand Reset
- Modem Initialization
- Setting or changing the Remote Dial Out Number
- Downloading Profile Data
- Unit Initialization
- Setting/Changing Unit ID, Group and Location information
- Configuring Unit Call-In schedule
- Resetting Meter Display

# MAINTENANCE

The Class 500 Meter unit is shipped in a calibrated and fully functionally tested condition. Since the unit is factory calibrated using proprietary firmware algorithms, no internal unit adjustments are necessary. This unit contains no internal adjustments. Therefore no preventative or scheduled maintenance is required, or cleaning or decontamination procedures.

## Lithium Battery Replacement Instructions

The Class 500 Meter has a lithium battery cell that is used to retain the contents of SRAM and the RTC during power outages. The battery has a life expectancy greater than 8 years (See Table 3 for battery specifications).

Table 3. Battery specifications (25 °C)

|                              |                          |
|------------------------------|--------------------------|
| Nominal working voltage      | 3.5 VDC output           |
| Nominal current capacity:    | 350 mAhr                 |
| Cell chemical:               | Lithium-thionyl chloride |
| Operating temperature range: | -40 to +95 °C            |
| Manufacturer:                | Eagle-Picher             |
| Manufacturer's part number:  | LTC-3PN                  |

### ⚠ WARNING

Only replace battery with the exact part number from the manufacturer specified above.

### ⚠ CAUTION

The battery is not completely discharged, therefore **DO NOT** short the terminals on the battery with any conductive material.

### ⚠ CAUTION

The internal circuit card components are extremely sensitive to electrostatic discharge. Be careful not to touch internal circuitry prior to discharging any static build-up on your person. To discharge yourself, touch a grounded metal object such as a conduit or a metal enclosure exterior.

The battery cell is mounted in a socket on the upper right side of the main power board (See Fig. 13). Should the battery capacity drop below 2.4 VDC, the display will illuminate a battery symbol on the left margin indicating a low battery. Additionally, the internal unit firmware will set a flag indicating the low battery condition. When the unit data is next downloaded, the monitoring facility will be alerted of the low battery and will schedule a service call.

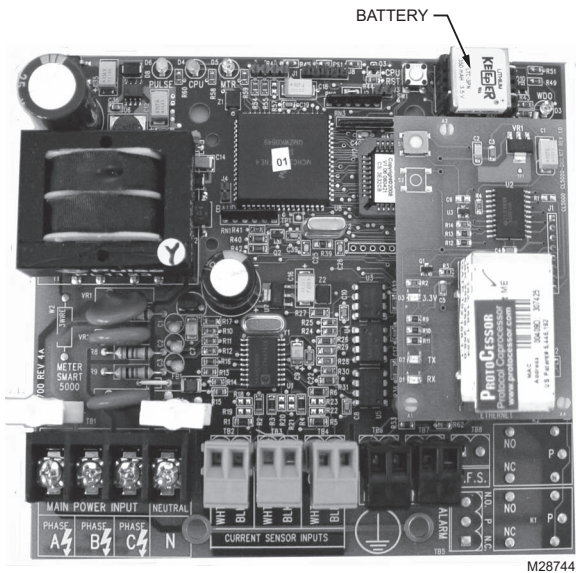


Fig. 13. Location of battery.

Use the following procedure to replace the lithium battery cell.

1. Disconnect power from the Class 500 Meter at the unit external circuit breaker.
2. Remove the battery from its socket and place it on a non-conductive surface.
3. Install the new battery into the PCB battery socket.

NOTE: The main power board battery socket is keyed to prevent the user from inserting the new battery in the wrong polarity. No damage will occur to the unit or battery if the battery is inadvertently installed in the wrong direction.

4. Visually inspect the new battery to verify that all leads are fully inserted into their respective socket positions.
5. Dispose of the used battery in accordance with the manufacturer's (Eagle Picher) instructions.

## EXTERNAL CONTACT INPUT

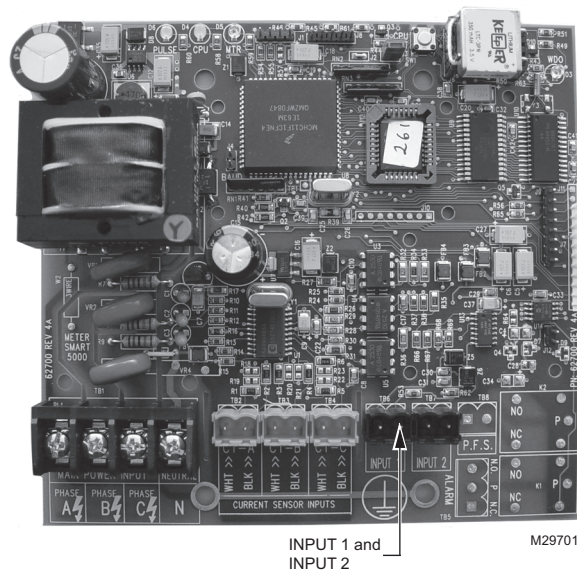
Two additional channels are available (channels 3 and 4) on the Class 500 Meter to be used for capturing pulses from external devices. These devices can be another electric meter, a water meter, a gas meter, or any unit with an output pulse. The output pulse of the device must be in the form of a dry contact - either physical or electronic.

Count speeds of up to 10 Hz (600 ppm) are accepted by the Class 500 Meter, and the count is available at Modbus point locations 41083 and 41085. See the point-map (Table 4) for more information.

## Wiring

The external pulse is wired into the Class 500 Meter through the terminals marked "INPUT 1" and "INPUT 2" (TB6 and TB7). These consist of removable plug and header assemblies similar to the current sensor inputs.

The external device can be mounted up to 100 feet away from the Class 500 Meter, and wire sizes from 24 to 16 gauge (AWG) can be used for the connection. **If the external device utilizes a polarity-dependent, solid-state contact, the plus (+) from the contact must terminate on the left hand pin of the headers on the Meter.**



## Modbus Point Map

Modbus data points available from the Class 500 meter. Listed under Class 500.

**Table 4. Honeywell Modbus point map**

|    | INTEGER | W | FLOAT | UOM     | CALC. | MEM | OP  | DESCRIPTION                         | CLASS 500 |
|----|---------|---|-------|---------|-------|-----|-----|-------------------------------------|-----------|
| 1  | 40001   | 2 | 41001 | kWh     | T-del | NV  | R/W | Energy delivered                    | Y         |
| 2  | 40003   | 2 | 41003 | kWh     | T-rec | NV  | R/W | Energy received                     | Y         |
| 3  | 40005   | 2 | 41005 | kVARh   | T-del | NV  | R/W | Reactive energy delivered           | Y         |
| 4  | 40007   | 2 | 41007 | kVARh   | T-rec | NV  | R/W | Reactive energy received            | Y         |
| 5  |         |   | 41009 | kW      | T     |     | R   | Real power                          | Y         |
| 6  |         |   | 41011 | kVAR    | T     |     | R   | Reactive power                      | Y         |
| 7  |         |   | 41013 | kVA     | T     |     | R   | Apparent power                      | Y         |
| 8  |         |   | 41015 | %       | T     |     | R   | Power factor                        | Y         |
| 9  |         |   | 41017 | Amps    | T     |     | R   | Current total                       | Y         |
| 10 |         |   | 41019 | Amps    | A     |     | R   | Current average                     | Y         |
| 11 |         |   | 41021 | Volts-N | A     |     | R   | Voltage line-neutral                | Y         |
| 12 |         |   | 41023 | Volts-L | A     |     | R   | Voltage line-line                   | Y         |
| 13 |         |   | 41025 | Hz      | A     |     | R   | Frequency                           | Y         |
| 14 |         |   | 41027 | Degree  | A     |     | R   | Phase angle                         | Y         |
| 15 |         |   | 41029 | kW      | ØA    |     | R   | Real power, phase A                 | Y         |
| 16 |         |   | 41031 | kW      | ØB    |     | R   | Real power, phase B                 | Y         |
| 17 |         |   | 41033 | kW      | ØC    |     | R   | Real power, phase C                 | Y         |
| 18 |         |   | 41035 | kVAR    | ØA    |     | R   | Reactive power, phase A             | Y         |
| 19 |         |   | 41037 | kVAR    | ØB    |     | R   | Reactive power, phase B             | Y         |
| 20 |         |   | 41039 | kVAR    | ØC    |     | R   | Reactive power, phase C             | Y         |
| 21 |         |   | 41041 | kVA     | ØA    |     | R   | Apparent power, phase A             | Y         |
| 22 |         |   | 41043 | kVA     | ØB    |     | R   | Apparent power, phase B             | Y         |
| 23 |         |   | 41045 | kVA     | ØC    |     | R   | Apparent power, phase C             | Y         |
| 24 |         |   | 41047 | % PF    | ØA    |     | R   | Power factor, phase A               | Y         |
| 25 |         |   | 41049 | % PF    | ØB    |     | R   | Power factor, phase B               | Y         |
| 26 |         |   | 41051 | % PF    | ØC    |     | R   | Power factor, phase C               | Y         |
| 27 |         |   | 41053 | Amps    | ØA    |     | R   | Current, phase A                    | Y         |
| 28 |         |   | 41055 | Amps    | ØB    |     | R   | Current, phase B                    | Y         |
| 29 |         |   | 41057 | Amps    | ØC    |     | R   | Current, phase C                    | Y         |
| 30 |         |   | 41059 | Volts-N | ØA    |     | R   | Voltage, line to neutral, phase A-N | Y         |
| 31 |         |   | 41061 | Volts-N | ØB    |     | R   | Voltage, line to neutral, phase B-N | Y         |
| 32 |         |   | 41063 | Volts-N | ØC    |     | R   | Voltage, line to neutral, phase C-N | Y         |
| 33 |         |   | 41065 | Volts-L | ØA    |     | R   | Voltage, line to line, phase A-B    | Y         |
| 34 |         |   | 41067 | Volts-L | ØB    |     | R   | Voltage, line to line, phase B-C    | Y         |
| 35 |         |   | 41069 | Volts-L | ØC    |     | R   | Voltage, line to line, phase C-A    | Y         |
| 36 |         |   | 41071 | Degree  | ØA    |     | R   | Phase angle, phase A                | Y         |
| 37 |         |   | 41073 | Degree  | ØB    |     | R   | Phase angle, phase B                | Y         |
| 38 |         |   | 41075 | Degree  | ØC    |     | R   | Phase angle, phase C                | Y         |
| 39 |         |   | 41077 |         |       |     |     |                                     |           |
| 40 |         |   | 41079 |         |       |     |     |                                     |           |
| 41 |         |   | 41081 |         |       |     |     |                                     |           |
| 42 |         |   | 41083 | Pulse   |       |     |     | Auxiliary Input 1                   | Y         |
| 43 |         |   | 41085 | Pulse   |       |     |     | Auxiliary Input 2                   | Y         |

Table 4. Honeywell Modbus point map

| ITEM | PM-I  | W | DATA (SAMPLE)                           | DESCRIPTION                                                            |     |
|------|-------|---|-----------------------------------------|------------------------------------------------------------------------|-----|
|      | 46001 | 8 | 504D 324B 0106 0421 0800 454D 4F4E 2020 | Firmware version: PM 5K, Ver, Ver date/time, Honeywell                 | R   |
|      | 46009 | 8 | 456E 6572 6779 204D 6574 6572 0000 0000 | Device description: Honeywell Energy Meter                             | R   |
|      | 46017 | 8 | 1356 4503 0613 0300 0000 0000 0000 0000 | Initialize device with date/time                                       | W   |
|      | 46025 | 8 | 1356 4503 0613 0300 0000 0000 0000 0000 | RTC date/time, will accept broadcast command                           | R/W |
|      | 46033 | 8 | 1356 4503 0527 0300 0000 0000 0000 0000 | CPU date/time (7 bytes, rest is reserved for other future formats)     | R/W |
|      | 46041 | 8 | 0001 0001 0000 0000 0000 0311 0020 1100 | Group, location, Device ID number                                      | R/W |
|      | 46049 | 8 | 0041 0000 0000 0000 0000 0311 0020 1100 | Dev. ID, Hookup, Serial numbers....                                    | R/W |
|      | 46057 | 8 | 0592 0007 0000 0000 0000 0000 0000 0000 | Recorder info.: idr, dem. int., dem. win., dem. syn., timezone, DST... | R/W |
|      | 46065 | 8 | 0101 0001 0D03 3531 1000 0320 0000 0000 | Meter info.: SN1&2, pulse rate, Volt/Amp/CTs, PF/mult1&2, CT, PT       | R/W |
|      |       |   |                                         |                                                                        |     |
|      |       |   |                                         |                                                                        |     |
|      | 46513 | 8 | 0000 0101 0000 0000 0000 0100 0000 0000 | Flags L1                                                               |     |
|      | 46521 | 8 | 0000 0000 0000 0000 0000 0000 0613 0316 | Flags L2                                                               |     |
|      | 46529 | 8 | 0000 0000 0000 0000 0000 0000 0000 0000 | Flags L3                                                               |     |
|      | 46537 | 8 | 0000 0000 0000 0000 0000 0000 0000 0000 | Flags L4                                                               |     |

NOTE: To change device ID, set single point at 46049 with data set to new device ID (e.g., 1 to 247).

To set date/time, set multiple points at 46025 for 4 points with data set to HHMM SSDW MMDD YYYY (DW=day of week).

To clear single meter kWh/kW, set single point at 41001 with data set to 0000 (similarly for 41003, 41005, 41007).

To clear multiple meter readings, set multiple point at 41001 for 8 points with data set to 0000's.

NOTE: Jumper J5 & J6 must be closed in order for kWh del/rec and kVARh del/rec to be cleared.

## FREQUENTLY ASKED QUESTIONS

**Q. When providing line voltage to the Class 500 Meter, can I tap off of the same breaker I am monitoring?**

A. Yes, the voltage can be pulled from the same breaker being monitored.

**Q. Can the Class 500 Meter line voltage wires be run in the same conduit as the sensor leads?**

A. Yes, there will be no effect on the Class 500 Meter if the sensor leads and line voltage wires are run in the same conduit.

**Q. How do I find the cost for kWh and kW to bill my tenants?**

A. Your local utility bill should list the cost per kWh and kW. If not, simply call your utility and ask them to provide you with the cost per kWh and kW.

**Q. What size wire do I use for the line voltage leads?**

A. These wires are normally sized at #14 AWG, but be sure to confirm this requirement with your local and national electrical codes requirements.

**Q. What size wire should I use to extend the current sensor leads?**

A. These wires are normally #14 AWG, twisted pair arrangement. Consult your local electrical code for proper sizing requirements.

**Q. The load I need to monitor has parallel feeds. How do I install the current sensors for this application?**

A. There are two ways you can monitor parallel feeds. One method is to clamp the sensors around all feed wires for each phase. The second way to monitor parallel feeds is to clamp the sensor around one of the feed wires for each phase. When you read the Class 500, the final reading must be multiplied by the number of feed wires for each phase.

**Q. I have two subpanels I would like to monitor with one Class 500 Meter. These subpanels are fed by different transformers in the building. Can I parallel the sensors and monitor both panels with one Class 500 Meter?**

A. No. These panels cannot be monitored by one Class 500 because they are different power sources. When you parallel current sensors, all loads being monitored must be from the same voltage source.

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